Claims

1. A method for treating a subject to reduce the likelihood of streptococcal infection comprising

administering orally to a subject in need of such treatment an agent that binds to a hyaluronic acid-binding region of a CD44 protein in an amount effective to interfere with adhesion of streptococcal bacteria to CD44 protein in the subject and inhibit streptococcal colonization of the pharynx, wherein either one or both of the following conditions applies: the treatment is free of Echinacea or the agent is administered in a dose greater than 0.2 mg.

2. The method of claim 1, wherein the effective amount of the agent administered to the subject in need of such treatment statistically reduces the likelihood of infection.

3. The method of claim 1, wherein the agent is administered to a subject suspected of exposure to Group A streptococcus or Group C streptococcus.

4. The method of claim 3, wherein the subject is known to have been exposed to streptococcal bacteria.

5. The method of claim 3, wherein the subject is likely to be exposed to streptococcal bacteria.

6. The method of claim 1, wherein the subject is a human.

7. The method of claim 1, wherein the subject is in need of such treatment to reduce the likelihood of streptococcal pharyngitis.

8. The method of claim 1, wherein the CD44 protein in the subject in need of such treatment is located on the pharynx.

9. The method of claim 1, wherein the agent is hyaluronic acid or an analog of hyaluronic acid.

10. The method of claim 9, wherein the agent is a peptide.

11. The method of claim 10, wherein the peptide is an antibody.

12. The method of claim 1, wherein the dose is a single oral administration of hyaluronic acid.

13. The method of claim 1, wherein the dose is multiple oral administrations of hyaluronic acid.

14. The method of claim 1, wherein a dose of at least 0.2 mg is administered in under 2 hours.

15. The method of claim 1, wherein a dose of at least 0.2 mg is administered in under 1 hour.

16. The method of claim 1, wherein a dose of at least 0.2 mg is administered in under 30 minutes.

17. The method of claim 1, wherein a dose of at least 0.2 mg is administered in under 15 minutes.

18. The method of claims 14, 15, 16, or 17, wherein the dose is at least 0.25mg, 0.30mg, 0.40mg, 0.50mg, 0.60mg, 0.70mg, 0.80mg, 0.90mg, 1.0mg, 1.25mg, 1.5mg, 1.75mg, 2.0mg, 2.25mg, 2.5mg, 2.75mg, 3.0mg, 4.0mg. 5.0mg, 6.0mg, 7.0mg, 8.0mg, 9.0mg, or 10.0mg hyaluronic acid.

19. The method of claim 14, wherein the dose is administered in under 1.5 hours, 1.0 hours, 45 minutes, 30 minutes, 15 minutes, 10 minutes, 5 minutes, 4 minutes, 3 minutes, 2 minutes, 1 minutes, 30 seconds, 15 seconds, 10 seconds, 5 seconds, or 1 second.

20. The method of claims 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, or 19, wherein the treatment is free of Echinacea.

21. The method of claim 18, wherein the treatment is free of Echinacea.

22. The method of claim 1, wherein the treatment is free of Echinacea.

23. A method for treating a subject to reduce the likelihood of streptococcal infection comprising

administering orally to a subject in need of such treatment an agent that binds to a hyaluronic acid-binding region of a CD44 protein in an amount effective to displace streptococcal bacteria to CD44 protein in the subject and inhibit streptococcal colonization of the pharynx, wherein either one or both of the following conditions applies: the treatment is free of Echinacea or the agent is administered in a dose greater than 0.2 mg.

24. The method of claim 23, wherein the effective amount of the agent administered to the subject in need of such treatment statistically reduces the likelihood of infection.

25. The method of claim 23, wherein the agent is administered to a subject suspected of exposure to Group A streptococcus or Group C streptococcus.

26. The method of claim 25, wherein the subject has not been determined to have streptococcal infection.

27. The method of claim 25, wherein the subject has been determined to have streptococcal infection.

28. The method of claim 23, wherein the subject is a human.

29. The method of claim 23, wherein the subject is in need of such treatment to reduce the likelihood of streptococcal pharyngitis.

30. The method of claim 23, wherein the CD44 protein in the subject in need of such treatment is located on the pharynx.

31. The method of claim 23, wherein the agent is hyaluronic acid or an analog of hyaluronic acid.

32. The method of claim 31, wherein the agent is a peptide.

33. The method of claim 32, wherein the peptide is an antibody.

34. The method of claim 23, wherein the dose is a single oral administration of hyaluronic acid.

35. The method of claim 23, wherein the dose is multiple oral administrations of hyaluronic acid.

36. The method of claim 23, wherein a dose of at least 0.2 mg is administered in under 2 hours.

37. The method of claim 23, wherein a dose of at least 0.2 mg is administered in under 1 hour.

38. The method of claim 23, wherein a dose of at least 0.2 mg is administered in under 30 minutes.

39. The method of claim 23, wherein a dose of at least 0.2 mg is administered in under 15 minutes.

40. The method of claims 36, 37, 38, or 39, wherein the dose is at least 0.25mg, 0.30mg, 0.40mg, 0.50mg, 0.60mg, 0.70mg, 0.80mg, 0.90mg, 1.0mg, 1.25mg, 1.5mg, 1.75mg, 2.0mg, 2.25mg, 2.5mg, 2.75mg, 3.0mg, 4.0mg. 5.0mg, 6.0mg, 7.0mg, 8.0mg, 9.0mg, or 10.0mg hyaluronic acid.

41. The method of claim 36, wherein the dose is administered in under 1.5 hours, 1.0 hours, 45 minutes, 30 minutes, 15 minutes, 10 minutes, 5 minutes, 4 minutes, 3 minutes, 2 minutes, 1 minutes, 30 seconds, 15 seconds, 10 seconds, 5 seconds, or 1 second.

42. The method of claims 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, or 41, wherein the treatment is free of Echinacea.

43. The method of claim 40, wherein the treatment is free of Echinacea.

44. The method of claim 23, wherein the treatment is free of Echinacea.

45. A method for treating a subject to reduce the likelihood of streptococcal or staphylococcal infection comprising

administering orally to a subject in need of such treatment an agent that binds to a hyaluronic acid-binding region of a CD44 protein of a mucosal membrane in an amount effective to interfere with adhesion of streptococcal or staphylococcal bacteria to the mucosal membrane in the subject, wherein either one or both of the following conditions applies: the treatment is free of Echinacea or the agent is administered in a dose greater than 0.2 mg.

46. The method of claim 45, wherein the hyaluronic acid interferes with adhesion of streptococcal bacteria to CD44 protein of a mucosal membrane in the subject.

47. The method of claim 45, wherein the effective amount of the agent administered to the subject in need of such treatment statistically reduces the likelihood of infection.

48. The method of claim 45, wherein the agent is administered to a subject suspected of exposure to Group A streptococcus, Group C streptococcus, Group B streptococcus, Streptococcus pneumoniae, or Staphylococcus aureus.

49. The method of claim 48, wherein the subject is known to have been exposed to streptococcal or staphylococcal bacteria.

50. The method of claim 48, wherein the subject is likely to be exposed to streptococcal or staphylococcal bacteria.

51. The method of claim 45, wherein the subject is a human.

52. The method of claim 45, wherein the subject is in need of such treatment to reduce the likelihood of streptococcal or staphylococcal pharyngitis.

53. The method of claim 45, wherein the CD44 protein of the mucosal membrane in the subject in need of such treatment is located on the pharynx.

54. The method of claim 45, wherein the agent is hyaluronic acid or an analog of hyaluronic acid.

55. The method of claim 54, wherein the agent is a peptide.

56. The method of claim 55, wherein the peptide is an antibody.

57. The method of claim 45, wherein the dose is a single oral administration of hyaluronic acid.

58. The method of claim 45, wherein the dose is multiple oral administrations of hyaluronic acid.

59. The method of claim 45, wherein a dose of at least 0.2 mg is administered in under 2 hours.

60. The method of claim 45, wherein a dose of at least 0.2 mg is administered in under 1 hour.

61. The method of claim 45, wherein a dose of at least 0.2 mg is administered in under 30 minutes.

62. The method of claim 45, wherein a dose of at least 0.2 mg is administered in under 15 minutes.

63. The method of claims 59, 60, 61, or 62, wherein the dose is at least 0.25mg, 0.30mg, 0.40mg, 0.50mg, 0.60mg, 0.70mg, 0.80mg, 0.90mg, 1.0mg, 1.25mg, 1.5mg, 1.75mg, 2.0mg, 2.25mg, 2.5mg, 2.75mg, 3.0mg, 4.0mg. 5.0mg, 6.0mg, 7.0mg, 8.0mg, 9.0mg, or 10.0mg hyaluronic acid.

64. The method of claim 59, wherein the dose is administered in under 1.5 hours, 1.0 hours, 45 minutes, 30 minutes, 15 minutes, 10 minutes, 5 minutes, 4 minutes, 3 minutes, 2 minutes, 1 minutes, 30 seconds, 15 seconds, 10 seconds, 5 seconds, or 1 second.

65. The method of claims 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, or 64, wherein the treatment is free of Echinacea.

66. The method of claim 63, wherein the treatment is free of Echinacea.

67. The method of claim 45, wherein the treatment is free of Echinacea.

68. A method for treating a subject to reduce the likelihood of streptococcal or staphylococcal infection comprising

administering orally to a subject in need of such treatment an agent that binds to a hyaluronic acid-binding region of a CD44 protein of a mucosal membrane in an amount effective to displace streptococcal or staphylococcal bacteria bound to the mucosal membrane in the subject, wherein either one or both of the following conditions applies: the treatment is free of Echinacea or the agent is administered in a dose greater than 0.2 mg.

69. The method of claim 68, wherein the hyaluronic acid interferes with adhesion of streptococcal bacteria to CD44 protein of a mucosal membrane in the subject.

70. The method of claim 68, wherein the effective amount of the agent administered to the subject in need of such treatment statistically reduces the likelihood of infection.

71. The method of claim 68, wherein the agent is administered to a subject suspected of exposure to Group A streptococcus, Group C streptococcus, Group B streptococcus, Streptococcus pneumoniae, or Staphylococcus aureus.

72. The method of claim 71, wherein the subject has not been determined to have been exposed to streptococcal or staphylococcal infection.

73. The method of claim 71, wherein the subject has been determined to have been exposed to streptococcal or staphylococcal infection.

74. The method of claim 68, wherein the subject is a human.

75. The method of claim 68, wherein the subject is in need of such treatment to reduce the likelihood of streptococcal or staphylococcal pharyngitis.

76. The method of claim 68, wherein the CD44 protein of the mucosal membrane in the subject in need of such treatment is located on the pharynx.

77. The method of claim 68, wherein the agent is hyaluronic acid or an analog of hyaluronic acid.

78. The method of claim 77, wherein the agent is a peptide.

79. The method of claim 78, wherein the peptide is an antibody.

80. The method of claim 68, wherein the dose is a single oral administration of hyaluronic acid.

81. The method of claim 68, wherein the dose is multiple oral administrations of hyaluronic acid.

82. The method of claim 68, wherein a dose of at least 0.2 mg is administered in under 2 hours.

83. The method of claim 68, wherein a dose of at least 0.2 mg is administered in under 1 hour.

84. The method of claim 68, wherein a dose of at least 0.2 mg is administered in under 30 minutes.

85. The method of claim 68, wherein a dose of at least 0.2 mg is administered in under 15 minutes.

86. The method of claims 82, 83, 84, or 85, wherein the dose is at least 0.25mg, 0.30mg, 0.40mg, 0.50mg, 0.60mg, 0.70mg, 0.80mg, 0.90mg, 1.0mg, 1.25mg, 1.5mg, 1.75mg, 2.0mg, 2.25mg, 2.5mg, 2.75mg, 3.0mg, 4.0mg. 5.0mg, 6.0mg, 7.0mg, 8.0mg, 9.0mg, or 10.0mg hyaluronic acid.

87. The method of claim 82, wherein the dose is administered in under 1.5 hours, 1.0 hours, 45 minutes, 30 minutes, 15 minutes, 10 minutes, 5 minutes, 4 minutes, 3 minutes, 2 minutes, 1 minutes, 30 seconds, 15 seconds, 10 seconds, 5 seconds, or 1 second.

88. The method of claims 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, or 87, wherein the treatment is free of Echinacea.

89. The method of claim 86, wherein the treatment is free of Echinacea.

90. The method of claim 68, wherein the treatment is free of Echinacea.

91. A method for treating a subject to reduce the likelihood of streptococcal or staphylococcal infection comprising

administering nasally to a subject in need of such treatment who does not have a nasal cavity wound, an agent that binds to a hyaluronic acid-binding region of a CD44 protein of a mucosal membrane in an amount effective to interfere with adhesion of streptococcal or staphylococcal bacteria to the mucosal membrane in the subject, wherein either one or both of the following conditions applies: the treatment is free of Echinacea or the agent is administered in a dose greater than 0.2 mg.

92. The method of claim 91, wherein the hyaluronic acid interferes with adhesion of streptococcal bacteria to CD44 protein of a mucosal membrane in the subject.

93. The method of claim 91, wherein the CD44 protein of the mucosal membrane in the subject in need of such treatment is on a nasal mucosal membrane.

94. The method of claim 91, wherein the effective amount of the agent administered to the subject in need of such treatment statistically reduces the likelihood of infection.

95. The method of claim 91, wherein the agent is administered to a subject suspected of exposure to Group A streptococcus, Group C streptococcus, Group B streptococcus, Streptococcus pneumoniae, or Staphylococcus aureus.

96. The method of claim 95, wherein the subject is known to have been exposed to streptococcal or staphylococcal bacteria.

97. The method of claim 95, wherein the subject is likely to be exposed to streptococcal or staphylococcal bacteria.

98. The method of claim 91, wherein the subject is a human.

99. The method of claim 91, wherein the subject is in need of such treatment to reduce the likelihood of streptococcal or staphylococcal pharyngitis.

100. The method of claim 91, wherein the CD44 protein of the mucosal membrane in the subject in need of such treatment is located on the pharynx.

101. The method of claim 91, wherein the agent is hyaluronic acid or an analog of hyaluronic acid.

102. The method of claim 101, wherein the agent is a peptide.

103. The method of claim 102, wherein the peptide is an antibody.

104. The method of claim 91, wherein the dose is a single oral administration of hyaluronic acid.

105. The method of claim 91, wherein the dose is multiple oral administrations of hyaluronic acid.

106. The method of claim 91, wherein a dose of at least 0.2 mg is administered in under 2 hours.

107. The method of claim 91, wherein a dose of at least 0.2 mg is administered in under 1 hour.

108. The method of claim 91, wherein a dose of at least 0.2 mg is administered in under 30 minutes.

109. The method of claim 91, wherein a dose of at least 0.2 mg is administered in under 15 minutes.

110. The method of claims 106, 107, 108, or 109, wherein the dose is at least 0.25mg, 0.30mg, 0.40mg, 0.50mg, 0.60mg, 0.70mg, 0.80mg, 0.90mg, 1.0mg, 1.25mg, 1.5mg, 1.75mg,

2.0mg, 2.25mg, 2.5mg, 2.75mg, 3.0mg, 4.0mg. 5.0mg, 6.0mg, 7.0mg, 8.0mg, 9.0mg, or 10.0mg hyaluronic acid.

111. The method of claim 106, wherein the dose is administered in under 1.5 hours, 1.0 hours, 45 minutes, 30 minutes, 15 minutes, 10 minutes, 5 minutes, 4 minutes, 3 minutes, 2 minutes, 1 minutes, 30 seconds, 15 seconds, 10 seconds, 5 seconds, or 1 second.

112. The method of claims 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, or 112, wherein the treatment is free of Echinacea.

113. The method of claim 110, wherein the treatment is free of Echinacea.

114. The method of claim 91, wherein the treatment is free of Echinacea.

115. A method for treating a subject to reduce the likelihood of streptococcal or staphylococcal infection comprising

administering nasally to a subject in need of such treatment who does not have a nasal cavity wound, an agent that binds to a hyaluronic acid-binding region of a CD44 protein of a mucosal membrane in an amount effective to displace streptococcal or staphylococcal bacteria bound to the mucosal membrane in the subject, wherein either one or both of the following conditions applies: the treatment is free of Echinacea or the agent is administered in a dose greater than 0.2 mg.

116. The method of claim 115, wherein the hyaluronic acid interferes with adhesion of streptococcal bacteria to CD44 protein of a mucosal membrane in the subject.

117. The method of claim 115, wherein the CD44 protein of the mucosal membrane in the subject in need of such treatment is on a nasal mucosal membrane.

118. The method of claim 115, wherein the effective amount of the agent administered to the subject in need of such treatment statistically reduces the likelihood of infection.

119. The method of claim 115, wherein the agent is administered to a subject suspected of exposure to Group A streptococcus, Group C streptococcus, Group B streptococcus, Streptococcus pneumoniae, or Staphylococcus aureus.

120. The method of claim 119, wherein the subject has not been determined to have been exposed to streptococcal or staphylococcal infection.

121. The method of claim 119, wherein the subject has been determined to have been exposed to streptococcal or staphylococcal infection.

122. The method of claim 115, wherein the subject is a human.

123. The method of claim 115, wherein the subject is in need of such treatment to reduce the likelihood of streptococcal or staphylococcal pharyngitis.

124. The method of claim 115, wherein the CD44 protein of the mucosal membrane in the subject in need of such treatment is located on the pharynx.

125. The method of claim 115, wherein the agent is hyaluronic acid or an analog of hyaluronic acid.

126. The method of claim 125, wherein the agent is a peptide.

127. The method of claim 126, wherein the peptide is an antibody.

128. The method of claim 115, wherein the dose is a single oral administration of hyaluronic acid.

129. The method of claim 115, wherein the dose is multiple oral administrations of hyaluronic acid.

130. The method of claim 115, wherein a dose of at least 0.2 mg is administered in under 2 hours.

131. The method of claim 115, wherein a dose of at least 0.2 mg is administered in under 1 hour.

132. The method of claim 115, wherein a dose of at least 0.2 mg is administered in under 30 minutes.

133. The method of claim 115, wherein a dose of at least 0.2 mg is administered in under 15 minutes.

134. The method of claims 130, 131, 132, or 133, wherein the dose is at least 0.25mg, 0.30mg, 0.40mg, 0.50mg, 0.60mg, 0.70mg, 0.80mg, 0.90mg, 1.0mg, 1.25mg, 1.5mg, 1.75mg, 2.0mg, 2.25mg, 2.5mg, 2.75mg, 3.0mg, 4.0mg. 5.0mg, 6.0mg, 7.0mg, 8.0mg, 9.0mg, or 10.0mg hyaluronic acid.

135. The method of claim 130, wherein the dose is administered in under 1.5 hours, 1.0 hours, 45 minutes, 30 minutes, 15 minutes, 10 minutes, 5 minutes, 4 minutes, 3 minutes, 2 minutes, 1 minutes, 30 seconds, 15 seconds, 10 seconds, 5 seconds, or 1 second.

136. The method of claims 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, or 135, wherein the treatment is free of Echinacea.

137. The method of claim 134, wherein the treatment is free of Echinacea.

138. The method of claim 115, wherein the treatment is free of Echinacea.

139. A medicinal product comprising a syrup containing an amount of hyaluronic acid effective to interfere with adhesion of streptococcal bacteria to CD44 protein in a subject and to inhibit streptococcal colonization of a pharynx of the subject.

140. A medicinal product comprising a syrup containing an amount of hyaluronic acid effective to displace streptococcal bacteria bound to CD44 protein in a subject and to inhibit streptococcal colonization of a pharynx of the subject.

141. A medicinal product comprising a syrup containing an amount of hyaluronic acid effective to interfere with adhesion of streptococcal or staphylococcal bacteria to a mucosal membrane in a subject.

142. The medicinal product of claim 141, wherein the mucosal membrane in the subject is a pharynx of the subject.

143. A medicinal product comprising a syrup containing an amount of hyaluronic acid effective to displace streptococcal or staphylococcal bacteria bound to a mucosal membrane in a subject.

144. The medicinal product of claim 143, wherein the mucosal membrane in the subject is a pharynx of the subject.

145. A medicinal product comprising a frozen solution containing an amount of hyaluronic acid effective to interfere with adhesion of streptococcal bacteria to CD44 protein in a subject and to inhibit streptococcal colonization of a pharynx of the subject.

146. A medicinal product comprising a frozen solution containing an amount of hyaluronic acid effective to displace streptococcal bacteria bound to CD44 protein in a subject and to inhibit streptococcal colonization of a pharynx in the subject.

147. A medicinal product comprising a frozen solution containing an amount of hyaluronic acid effective to interfere with adhesion of streptococcal or staphylococcal bacteria to a mucosal membrane in a subject.

148. The medicinal product of claim 147, wherein the mucosal membrane in the subject is a pharynx of the subject.

149. A medicinal product comprising a frozen solution containing an amount of hyaluronic acid effective to displace streptococcal or staphylococcal bacteria bound to a mucosal membrane in a subject.

150. The medicinal product of claim 149, wherein the mucosal membrane in the subject is a pharynx of the subject.

151. A medicinal product comprising a solid solution containing an amount of hyaluronic acid effective to interfere with adhesion of streptococcal bacteria to CD44 protein in a subject and to inhibit streptococcal colonization of a pharynx of the subject.

152. A medicinal product comprising a solid solution containing an amount of hyaluronic acid effective to displace streptococcal bacteria bound to CD44 protein in a subject and to inhibit streptococcal colonization of a pharynx of the subject.

153. A medicinal product comprising a solid solution containing an amount of hyaluronic acid effective to interfere with adhesion of streptococcal or staphylococcal bacteria to a mucosal membrane in a subject.

154. The medicinal product of claim 153, wherein the mucosal membrane in the subject is a pharynx of the subject.

155. A medicinal product comprising a solid solution containing an amount of hyaluronic acid effective to displace streptococcal or staphylococcal bacteria bound to a mucosal membrane in the subject.

156. The medicinal product of claim 155, wherein the mucosal membrane in the subject is a pharynx of the subject.

157. A medicinal product comprising a semi-solid solution containing an amount of hyaluronic acid effective to interfere with adhesion of streptococcal bacteria to CD44 protein in a subject and to inhibit streptococcal colonization of a pharynx of the subject.

158. A medicinal product comprising a semi-solid solution containing an amount of hyaluronic acid effective to displace streptococcal bacteria bound to CD44 protein in a subject and to inhibit streptococcal colonization of a pharynx of the subject.

159. A medicinal product comprising a semi-solid solution containing an amount of hyaluronic acid effective to interfere with adhesion of streptococcal or staphylococcal bacteria to a mucosal membrane in a subject.

160. The medicinal product of claim 159, wherein the mucosal membrane in the subject is a pharynx of the subject.

161. A medicinal product comprising a semi-solid solution containing an amount of hyaluronic acid effective to displace streptococcal or staphylococcal bacteria bound to a mucosal membrane in a subject.

162. The medicinal product of claim 161, wherein the mucosal membrane in the subject is a pharynx of the subject.